

CLAIMS

1. A projector comprising:

a light source device;

5 a color separating optical system for separating a light flux emitted from the light source device into a plurality of color light components;

a plurality of optical modulation devices for modulating the color light components separated by the color separating optical system according to image information,  
10 respectively;

a color combining optical system for combining optical images modulated by the plurality of optical modulation devices; and

15 a projection optical system for enlarging and projecting the optical images combined by the color combining optical system,

wherein an optical filter for reflecting predetermined spectral components in the light flux is arranged at a position where an angle by which the light flux expands falls within  $20^\circ$  with respect to an illumination optical axis of the light flux on an optical path from the light source device to a light flux-emitting surface of the projection optical system.  
20

25 2. The projector according to Claim 1, further

comprising:

a case for housing a plurality of optical components disposed on the optical path of the light flux,

wherein the case comprises a moving mechanism for  
5 moving the optical filter into and out of the optical path.

3. The projector according to Claim 1 or 2,  
wherein the optical filter is disposed between the light source device and the color separating optical system.

4. The projector according to Claim 3, further  
10 comprising:

a uniform-illumination optical system disposed between the light source device and the color separating optical system for dividing the light flux emitted from the light source device into a plurality of partial light fluxes and  
15 overlapping the respective partial light fluxes on an image forming area of the optical modulation device,

wherein the optical filter is disposed in the uniform-illumination optical system.

5. The projector according to Claim 1 or 2,  
20 wherein the optical filter is disposed in the color separating optical system.

6. The projector according to Claim 5,  
wherein the color separating optical system comprises a first color light separating optical element for separating  
25 the light emitted from the light source device into a first

color light component and other color light components, and  
a second color light separating optical element for  
separating the other color light components separated by the  
first color light separating optical element into a second  
5 color light component and a second color light component,  
and

wherein the optical filter is disposed between the  
first color light separating optical element and the second  
color light separating optical element.

10 7. The projector according to Claim 1 or 2,

wherein the optical filter is disposed between the  
color combining optical system and the projection optical  
system.

8. A projector comprising:

15 a light source device;

a color separating optical system for separating a  
light flux emitted from the light source device into a  
plurality of color light components;

a plurality of optical modulation devices for  
20 modulating the plurality of light fluxes separated by the  
color separating optical system according to image  
information, respectively,

a color combining optical system for combining optical  
images modulated by the plurality of optical modulation  
25 devices, and

a projection optical system for enlarging and projecting the optical images combined by the color combining optical system,

wherein the projector further comprises:

5 a case for housing a plurality of optical components, disposed on an optical path of the light flux;

an optical filter for reflecting predetermined spectral components in the light flux; and

10 a moving mechanism for moving the optical filter into and out of the optical path by rotating the optical filter inside the case.

9. The projector according to Claim 8,

wherein the moving mechanism rotates the optical filter between a position at which the light flux passes through  
15 and a position at which the light flux does not pass through along a side wall on the optical path in the case.

10. The projector according to Claim 8 or 9, further comprising:

20 a uniform-illumination optical system disposed between the light source device and the color separating optical system for dividing the light flux emitted from the light source device into a plurality of partial light fluxes and overlapping the respective partial light fluxes on an image forming area of the optical modulation device,

25 wherein the optical filter is disposed in the uniform-

illumination optical system.

11. The projector according to Claim 8 or 9,  
wherein the optical filter is disposed in the color  
separating optical system.

5 12. The projector according to Claim 11,  
wherein the color separating optical system comprises:  
a first color light separating optical element for  
separating the light emitted from the light source device  
into a first color light component and other color light  
10 components; and

a second color light separating optical element for  
separating the other color light components separated by the  
first color light separating optical element into a second  
color light component and a third color light component, and  
15 wherein the optical filter is disposed between the  
first color light separating optical element and the second  
color light separating optical element.

13. The projector according to any one of Claims 8 to 11,  
wherein the case has a plane substantially parallel to  
20 a plane formed by the illumination optical axis,

wherein the moving mechanism comprises a rotating  
portion rotatably supported by the plane of the case, and  
wherein the optical filter is retained in the rotating  
portion and moves according to rotational movement of the  
25 rotating portion.

14. The projector according to Claim 13,

wherein the optical filter is mounted in a filter frame having a retaining portion protruded from the optical filter,

5 wherein the rotating portion has an engagement hole engaged with the retaining portion in the filter frame, and

wherein a guide groove is disposed between the optical filter and the rotating portion for guiding the movement of the optical filter by guiding the retaining portion.

10 15. A projector comprising:

a light source device;

a color separating optical system for separating a light flux emitted from the light source device into a plurality of color light components;

15 a plurality of optical modulation devices for modulating the plurality of color light components separated by the color separating optical system according to image information, respectively;

a color combining optical system for combining optical  
20 images modulated by the plurality of optical modulation devices; and

a projection optical system for enlarging and projecting the optical images combined by the color combining optical system,

25 wherein the projector further comprises:

an optical filter for reflecting predetermined spectral components in the light flux; and

a moving mechanism for moving the optical filter into and out of the optical path, and

5 wherein the moving mechanism slides the optical filter out of the optical path by allowing a first side, which is closer to an optical component downstream in the optical path from the optical filter and remoter from an optical component upstream in the optical path from the optical  
10 filter, to move upstream in the optical path and by allowing a second opposite side to be positioned downstream in the optical path, from among the two sides of the optical filter perpendicular to a plane formed by an illumination optical axis.

15 16. The projector according to Claim 15,

wherein the moving mechanism comprises:

a first shaft for supporting a portion of a side different from the first and second sides of the optical filter and disposed in the vicinity of the first side;

20 a second shaft for supporting a portion of the side different from the first and second sides of the optical filter and closer to the second side from the first side;

a first guide groove for guiding the first shaft so that the first shaft is movable along a direction

25 substantially parallel to the illumination optical axis; and

a second guide groove for guiding the second shaft so that the second shaft is movable along a direction which is not parallel to the illumination optical axis.

17. The projector according to Claim 16,

5 wherein the moving mechanism comprises a rotating portion rotatably supported on a plane parallel to the plane formed by the illumination optical axis, and

wherein the first shaft and the second shaft are retained in the rotating portion through the first guide  
10 groove and the second guide groove, respectively.

18. A projector comprising:

a light source device;

a color separating optical system for separating a light flux emitted from the light source device into a  
15 plurality of color light components;

a plurality of optical modulation devices for modulating the plurality of color light components separated by the color separating optical system according to image information, respectively;

20 a color combining optical system for combining optical images modulated by the plurality of optical modulation devices; and

a projection optical system for enlarging and projecting the optical images combined by the color  
25 combining optical system,

wherein the projector further comprises:

an optical filter for reflecting predetermined spectral components in the light flux; and

a moving mechanism for moving the optical filter into  
5 and out of the optical path, and

wherein the moving mechanism moves the optical filter out of the optical path, by allowing an opposite side to be rotated using, as a shaft, the vicinity of a side which is closer to an optical component downstream in the optical  
10 path from the optical filter and remoter from an optical component upstream in the optical path from the optical filter, from among the two sides of the optical filter perpendicular to a plane formed by an illumination optical axis.

15 19. The projector according to any one of Claims 15 to 18,

wherein the optical filter is disposed between the light source device and the color separating optical system.

20 20. The projector according to Claim 19, further comprising:

a uniform-illumination optical system disposed between the light source device and the color separating optical system for dividing the light flux emitted from the light source device into a plurality of partial light fluxes and  
25 overlapping the respective partial light fluxes on an image

forming area of the optical modulation device,

wherein the moving mechanism is disposed in the uniform-illumination optical system.

21. The projector according to any one of Claims 15 to  
5 18,

wherein the optical filter is disposed in the color separating optical system.

22. The projector according to Claim 21,

wherein the color separating optical system comprises a  
10 first color light separating optical element for separating the light emitted from the light source device into a first color light component and other color light components, and a second color light separating optical element for separating the other color light components separated by the  
15 first color light separating optical element into a second color light component and a second color light component, and

wherein the optical filter is disposed between the first color light separating optical element and the second  
20 color light separating optical element.

23. The projector according to any one of Claims 15 to  
18,

wherein the optical filter is disposed between the color combining optical system and the projection optical  
25 system.